

A DESCRIPTION OF ANALYSIS RESULTS

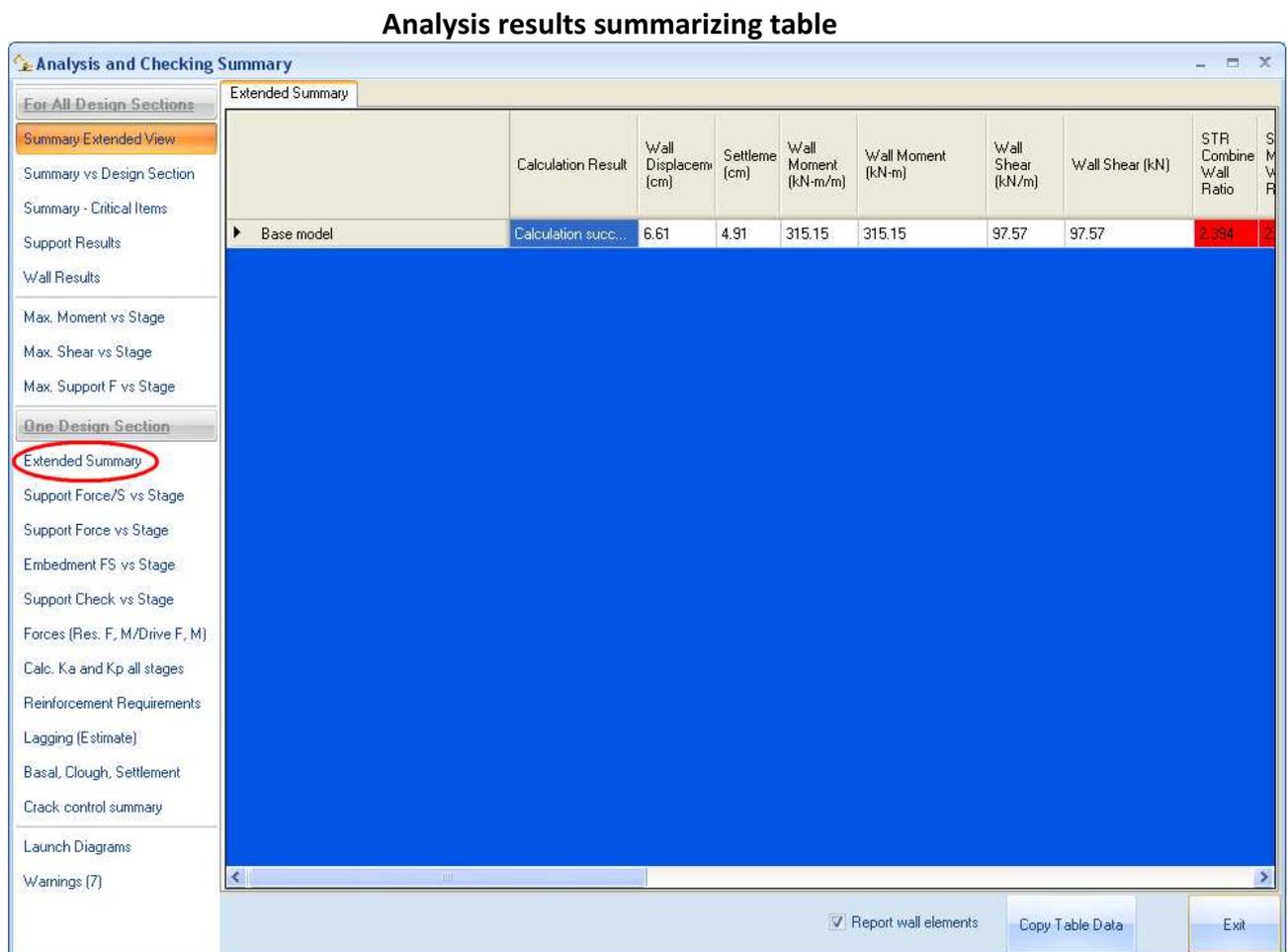


Figure 1: Summarizing table

The table in Figure 1 appears by itself when the analysis is over and can be visualized any time through the control *Preview summary reports on screen – Calculation Summary for all DS or Calculation summary (current DS)* under the Report menu. This table shows the chief results of the calculation, ordered:



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- Calculation result: wall displacement, settlement, internal actions;
- Wall check: stress ratio STR, tensional checks;
- Supports: reactions and checks;
- FS calculated by conventional analysis;
- FS calculated by non-linear analysis.

Results appeared refer to the highest values found for a particular design section during every step of the analysis. Select “extended summary”, marked in the figure, in order to visualize the results concerning each step.

There can be different situations:

- 1) The notice *Model collapses* appears in the first column, *Calculation results*: This means that the non-linear solver couldn't find an equilibrium contour for the wall, under the action of the loads, of the ground and water pressure and of the supports. In this case all the results are completely unreliable and the model must be modified. A red signal of prohibition appears beside the corresponding design section in the chief window of the program.
- 2) The notice *Calculation successfull* appears in the first column, *Calculation results*, and there is no red box in the whole line.

This means first of all, that the non-linear solver has found an equilibrium contour for the wall under all the actions, but also that every check are satisfied. In this case a green tick appears beside the corresponding design section in the chief window of the program.

- 3) The notice *Calculation successfull* appears in the first column, *Calculation results*, but there are some red box in the corresponding line.
- 4) This means that the non-linear solver has found an equilibrium contour for the wall under all the actions but there are some not satisfied checks. A red signal of prohibition appears beside the corresponding design section in the chief window of the program.

Detailed explanation of each column, starting form the left to the right in Figure 1:



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- Wall displacement: value of the maximum displacement of the wall top. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable.
- Settlement: value of the highest surface settlement. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable.
- Wall moment (kNm/m): This value makes sense when piles are used. This value represents the highest moment calculated on each pile, distributed on a length of one meter. Using sheet pile walls, diaphragm walls and custom walls this value corresponds with the one discussed in the next point. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable.
- Wall moment (kNm). When piles are used, this value represents the highest moment on each pile. Using sheet pile walls, diaphragm walls and custom walls this value corresponds with the one discussed in the previous point. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable, referring to stress ratio.
- Wall shear (kN/m). This value makes sense when piles are used. This value represents the highest shear calculated on each pile, distributed on a length of one meter. Using sheet pile walls, diaphragm walls and custom walls this value corresponds with the one discussed in the next point. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable, referring to stress ratio.
- Wall shear (kNm). When piles are used, this value represents the highest shear on each pile. Using sheet pile walls, diaphragm walls and custom walls this value corresponds with

the one discussed in the previous point. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable, referring to stress ratio.

	STR Combine Wall Ratio	STR Moment Wall Ratio	STR Shear Wall Ratio	Concrete Service Stress Wall Ratio FIC	Reinforcement Service Stress Ratio FIS	Max Support Reaction (kN/m)	Max Support Reaction (kN)	Critical Support Check
► Stage 0	0	0	0	0.004	0.005	0	0	0
Stage 1	2.394	2.394	0.898	1.232	1.61	0	0	0
Stage 2	2.394	2.394	0.898	1.232	1.61	0	0	0
Stage 3	2.338	2.338	0.981	1.203	1.572	31.89	95.66	0.587

Figure 1: Summarizing table

Detailed explanation of each column, starting from the left to the right in Figure 2:

- STR Combine wall ratio: check of the wall liable to a bending-compression regime; worst value between the two situations of constant N and constant eccentricity, used for diaphragm and concrete piles. Using steel walls it’s the worst value between bending-compression and buckling. This box is red coloured if $STR_{Comb} \geq 1$.
- STR Moment wall ratio: stress ratio of the wall liable to a bending compression regime. This box is red coloured if $STR_M \geq 1$. Refer to the examples in the DOC folder, in the installation folder, to deepen the resistant moment calculation.
- STR Shear wall ratio: stress ratio of the wall liable to a shear regime. This box is red coloured if $STR_{Shear} \geq 1$. Refer to the examples in the DOC folder, in the installation folder, to deepen the resistant shear calculation.
- Concrete Service STR FIC: it represents the ratio between the maximum normal load, acting on the concrete section and the allowed load for the chosen concrete. The box is red coloured if $STR \geq 1$, i.e. $\sigma_{c,max} \geq \sigma_{c,all}$.



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- Reinforcement Service STR FIS: it represents the ratio between the maximum normal load, acting on the steel section or on the reinforcement of a concrete section, and the allowed load for the chosen steel. The box is red coloured if $STR \geq 1$, i.e. $\sigma_{s,max} \geq \sigma_{s,all}$.
- Max support reaction (kN/m): highest support reaction distributed on a length of one meter on the wall. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable, referring to stress ratio.
- Max support reaction (kN): highest support reaction of each support. This box is never red coloured. The program does not “judge” the obtained value of displacement: the designer will decide by himself if it can be considered tolerable, referring to stress ratio.

	Max support Reaction (kN)	Critical Support Check	STR Support Ratio	Support Geotech Capacity Ratio (pull)	FS Basal	Toe FS Passive (Classic)	Toe FS Rotation (Classic)	Toe FS Length (Classic)	Zcut (Parati)	FS Mobilized Passive (Paratie)	FS True/Ac (Paratie)	Hydraulic Heave FS
▶ Stage 0		0	N/A	N/A	1000	9	9	38.462	N/A	6	1.502	N/A
Stage 1		0	N/A	N/A	3.555	3.946	2.667	2.053	N/A	3.599	1.113	N/A
Stage 2		0	0	0	3.555	N/A	4.803	4.75	N/A	3.599	1.113	N/A
Stage 3	5.66	0.587	0.106	0.587	3.442	N/A	4.022	3.931	N/A	3.078	1.097	N/A

Figure 2: Summarizing table

Detailed explanation of each column, starting from the left to the right in Figure 3:

- Critical support check: it represents the worst value among the ones reported in the two following boxes. It's red coloured when the value exceed 1.
- STR Support ratio. Using tiebacks this box reports the stress ratio of the strands that make up the free length of the tiebacks. Particularly this value represents the ratio between the support reaction and the resistant action (considering the multipliers, according to the Code chosen). Using slabs or struts it corresponds to the moment stress ratio. To deepen



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resistant actions calculation refer to the documents Tieback.pdf, Slub.pdf e Strut.pdf in the folder DOC - Examples in the installation folder.

This box is never red coloured because the support check is reported by the previous box *Critical support check*.

- Support geotech capacity ratio (pull out). It represents the pull out resistance stress ratio due to the ground-support skin friction. The pull out check is satisfied if this value doesn't exceed 1. This box is never red coloured because the support check is reported by the previous box *Critical support check*. To deepen resistant actions calculation refer to the documents Tieback.pdf in the folder DOC - Examples in the installation folder.
- FS basal. This safety factor is obtained by the non-linear analysis and represents the basal stability (cfr theory manual). This box is red coloured, i.e. the check is non satisfied, if the value exceed 1.
- Toe FS passive (classic). This safety factor is obtained by the conventional limit equilibrium method and represents the ratio between the acting and resistant horizontal forces (cfr Theory manual). This box is red coloured, i.e. the check is non satisfied, if the value is less than 1.
- Toe FS rotation (classic). This safety factor is obtained by the conventional limit equilibrium method and represents the ratio between the acting and resistant moment (cfr Theory manual). This box is red coloured, i.e. the check is non satisfied, if the value is less than 1.
- Toe FS length (classic). This safety factor is obtained by the conventional limit equilibrium method and refers to the embedment length effectiveness (cfr theory manual). This box is red coloured, i.e. the check is non satisfied, if the value is less than 1.



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- Zcut (Paratie). This function works starting from version 8.0.9.37. The internal Paratie engine gradually reduces the wall length until the wall collapses, in order to find the minimum embedment length.
- FS mobilized passive (Paratie). This coefficient represents the ratio between the passive pressure and the actually mobilized downhill pressure. This box is red coloured for values close to 1, i.e. when the passive pressure is almost totally mobilized. This ratio is the reciprocal of the one obtained with previous versions of Paratie.
- FS true/active (Paratie). This coefficient represents the ratio between the uphill pressure and the active pressure. This box is red coloured for values close to 1, i.e. when the wall undergoes such deflections that the uphill pressure is reduced almost to active pressure.
- Hydraulic heave FS. This coefficient is calculated only if the user chose the option flow-net under the water pressure options window. It represents safety towards hydraulic heave (cfr theory manual). The box is red coloured when the check is not satisfied, i.e. $FS < 1$.

Sometimes the table shows the symbol N/A (Not Available). The following list explains the meaning of this note according to its position in the table:

- Wall deflection: N/A never appears.
- Settlement: N/A means that surface settlements calculation is not active.
- Wall moment (kNm/m): N/A never appears.
- Wall moment (kNm): N/A never appears.
- Wall shear (kN/m): N/A never appears.



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- Wall shear (kN): N/A never appears.
- STR combine wall ratio: N/A means that wall check is not active or that the user chose a custom wall.
- STR moment wall ratio: N/A means that wall check is not active or that the user chose a custom wall.
- STR shear wall ratio: N/A means that wall check is not active or that the user chose a custom wall.
- Concrete service STR FIC: N/A means that wall check is not active or the results concern a ULS combination or a custom wall has been chosen.
- Reinforcement service STR FIS: N/A means that wall check is not active or the results concern a ULS combination or a custom wall has been chosen.
- Max support reaction (kN/m): N/A means that there aren't supports in the model.
- Max support reaction (kN): N/A means that there aren't supports in the model.
- Critical support check: N/A means that there aren't supports in the model.
- Support stress ratio: N/A means that there aren't supports in the model.
- Support geotech capacity ratio (pull out): N/A means that there aren't tiebacks in the model.
- FS basal: N/A means that the user chose the non-linear analysis only.



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- FS passive (classic): N/A means that the user chose the non-linear analysis only.
- Toe FS rotation (classic): N/A means that the user chose the non-linear analysis only.
- Toe FS length (classic): N/A means that the user chose the non-linear analysis only.
- Zcut (Paratie): currently a bug doesn't allow the visualization of the result. N/A is always shown.
- FS mobilized passive (Paratie): N/A means that the user chose the conventional analysis only.
- FS true/active (Paratie): N/A means that the user chose the conventional analysis only.
- Hydraulic heave FS: N/A means that the flow-net calculation is not active.

The table could show somewhere the value 100. Particularly it can occur with STR calculation. This shows the lack of data useful for the calculation of that values. calcolo di tali valori. For example, if the value 100 appears in the Support geotech capacity ratio box it could mean that the ultimate bond resistance is missing. For example if the value 100 appears in the Wall moment STR box it could be that the reinforcement has not been included in the wall. A check of all the necessary data is recommended.

Pleas pay attention to this remark:

When the user chose a conventional analysis, the program gives always a solution. In fact, unlike the non-linear analysis, the limit-equilibrium one alwas converges. However this doesn't mean that the results of th calculation is positive. In this case it's necessary to check the safety



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factors and make sure that all of them exceed 1. THIS means that the equilibrium is really warranted.